

SECTION 02225 - IRRIGATION TRENCHING AND BACKFILL

PART 1 - GENERAL

1.1 DESCRIPTION:

Work in this section consists of all labor, materials, and equipment necessary to do all work and related items as shown on the drawings, specified herein or incidental to proper execution of the work, including trenching, boring under, walks, and curbs, installation of pipe sleeves, and backfilling.

1.2 RELATED WORK DESCRIBED ELSEWHERE:

Irrigation System - Section 02760

1.3 QUALITY ASSURANCE:

For actual prosecution of the work, use only personnel who are skilled in the work required, familiar with recommended methods of installation, and thoroughly familiar with the requirements of this work.

1.4 UNDERGROUND OBSTRUCTIONS:

The Contractor shall contact all utilities for locations of their installations prior to initiating work.

The contractor shall hire a private utility locator to locate campground electrical lines.

The Contractor shall preserve, intact, any underground pipes or other utilities encountered during construction. In case any such utilities or other structures are accidentally broken or damaged, they shall be immediately replaced in a condition at least equal to that in which they were found, all at the expense of the Contractor.

The Contractor shall be solely responsible for locating all existing underground utilities, including service connections, in advance of excavating or trenching, by contacting the Owners thereof and prospecting. The Contractor shall use his own information and shall not rely solely upon information shown on the Drawings concerning existing underground installations. The Contractor shall repair all damage to existing utilities or property at his own expense. The Contractor shall pay all costs associated with having utility company representatives on the site for this work and shall include these costs in the price bid for related items of work.

Private utility locates for underground electrical will be required and are the responsibility of the contractor.

PART 2 - MATERIALS

2.1 PIPE SLEEVES:

Pipe sleeves shall be Schedule 40 PVC pipe, twice the diameter of the pipe to be installed in it, or equal approved by the Owner's Representative.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS:

A. Inspection

Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

Verify that trenching may be completed in accordance with the original design and the referenced standards.

B. Discrepancies

In the event of discrepancy, immediately notify the Owner's Representative.

Do not proceed with installation in areas of discrepancy until all discrepancies have been fully resolved.

3.2 TRENCHING:

A. General

All trenching shall be done in a manner to minimize impacts to existing landscaping and finish surfaces.

Every effort shall be made to close all trenches at the end of each day's work. Reseed backfilled trenches with a mixture of species approved in advance by the Owner's Representative. Where trenches are not closed at the end of the day, Contractor shall accept all liability for any damage or injury that may result from open trenches. Provide barricades and warning tape as necessary around all open trenches.

Perform all trenching required for the installation of items where the trenching is not specifically described in other sections of these Specifications.

B. Depth

All mainline shall have a minimum cover of 18" above the pipe. All laterals shall have a minimum cover of 12" above the pipe.

C. Correction of Faulty Grades

Where trench excavation is inadvertently carried below proper elevations, backfill with material approved by the Owner's Representative and then compact to provide a firm and unyielding subgrade to the approval of the Owner's Representative and at no additional cost to the Owner.

D. Grading and Stockpiling Trenched Material

Control the stockpiling of trenched material in a manner to prevent water running into the excavations.

Do not obstruct surface drainage but provide means whereby storm and waste waters are diverted into existing gutters, other surface drains, or temporary drains.

E. Alternative installation

Plowing or pulling of the piping will be allowed as long as all other specifications such as depth and sleeving are adhered to. Any piping damaged or deformed in the installation process will be replaced at contractors expense.

3.3 SLEEVES:

A. Locations

Sleeves shall be installed wherever routing of a pipe, wiring, or both crosses a paved or gravel area or passes through a bored hole.

B. Methods

Sleeves laid in open trenches shall be uniformly and evenly supported by undisturbed soil on the trench bottom. Backfill shall conform to standards hereinafter specified.

Sleeves installed in borings shall be forced through and shall have a snug fit throughout the length of the bored hole. Sleeves cracked or broken shall not be accepted.

3.4 BACKFILL:

A. Inspection

The trenching shall not be backfilled until inspection by owners representative has been completed and the pipe installation, including the grade, alignment and jointing has been found to be in compliance with the requirements of the plans and specifications.

B. Around and Over Pipe

Select backfill material consisting of sand, fine gravel or select earth, free of large lumps or rocks larger than 3/4 inch shall be used in backfilling around and over the installed pipe.

The select material shall be obtained from the excavation material removed from the trench and shall be processed by screening, sifting, or selective sorting, so as to produce the type of backfill herein specified. The Contractor may, at his option and own expense, provide an acceptable imported material.

This backfill material shall be carefully deposited around and over the pipe in layers not more than six (6) inches thick, loose measurement, unless otherwise permitted by the Owner's Representative, wetted to optimum moisture content and uniformly compacted to at least 95 percent of the maximum density obtainable at optimum moisture content as determined

by AASHTO T99 Method A or D (latest revision), until the pipe has a cover depth of at least one (1) foot.

C. Remainder of Trench Backfill

The remaining depth of the trench shall be backfilled with excavation materials removed from the trench, which shall be wetted or dried to near optimum moisture content.

This material shall be carefully deposited in layers of a thickness suitable to the equipment selected by the Contractor for proper compaction.

All material in landscaped or lawn areas shall be compacted to at least 85 percent of the maximum density as determined by AASHTO T99 Method A or D (latest revisions). All trench backfill material under pavements shall be compacted to at least 95 percent. The method of compaction selected by the Contractor shall not cause damage of any nature of the installed pipe.

The use of water puddling of this portion of the trench backfilling may be used if the specified density can be obtained and the backfill material is suitable for this type of trench compaction.

3.6 CLEANUP:

Upon completion of the work, the entire site shall be cleared of all debris, and ground surfaces shall be finished to smooth, uniform slopes and shall present a neat and workmanlike appearance. Cleanup shall be considered an incidental item, and no additional payment shall be made for any cleanup item. All fences, culverts, gravel driveways or other obstructions removed during construction shall be replaced in a condition at least equal to their existing condition.

3.7 MAINTENANCE:

The Contractor shall, for a period of one (1) year completion and final acceptance of the work, maintain and repair any trench or boring settlement which may occur, and shall make suitable repairs to any pavements, sidewalks, or other structures which may become damaged as a result of settlement. All such maintenance and repair shall be at the Contractor's expense.

END OF SECTION 02225

SECTION 02760 – IRRIGATION SYSTEM

Part 1 – GENERAL

1.1 DESCRIPTION

The work of this section consists of all items necessary to install the irrigation system required as indicated on the plans and includes, but not necessarily limited to:
Irrigation system, automatic controllers, and remote control valves.

1.2 RELATED WORK DESCRIBED ELSEWHERE:

Irrigation system, trenching and backfilling- Section 02225

1.3 QUALITY ASSURANCE:

- A. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and material manufacture's recommended methods of installation and who shall direct all work performed under this section.
- B. Coordination of work
All work of this section, shall be performed by one contractor.
- C. Codes and Standards
In addition to complying with all pertinent codes and regulations, comply with the latest rules of the National Electrical Code for all electrical work and materials.
Where provisions of pertinent codes and standards conflict with the requirements of this section of these specifications, the more stringent provisions shall govern.

1.4 SUBMITTALS:

A. Materials list

Before any irrigation system materials are delivered to the job site, submit to the owner's representative a complete list of all irrigation system materials proposed to be furnished and installed.

Show manufacturer's name and catalog number for each item, furnish complete catalog cuts and technical data, and furnish the manufacture's recommendations as to method of installation.

Do not permit any irrigation system components to be brought onto the job site until it has been approved by the owner's representative.

1.5 PRODUCT HANDLING:

A. Protection

Use all means necessary to protect irrigation system materials before, during and after installation and protect the installed work and materials of all other trades.

B. Replacements

In the event of damage, immediately make all repairs and replacements necessary to the approval of the owner's representative and at no additional cost to the owner.

Part 2 – MATERIALS

2.1 PIPE:

A. Plastic pipe

Plastic pipe shall be PE piping: SDR Nos. 5.3, 7, 9, with PE pipe, or Class 200 PVC pipe compound number required to give pressure rating not less than 150psi and insert fittings made of PA, PP or PVC, with serrated, male insert ends matching inside of pipe. Include bands or crimp rings.

Plastic pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles, and dents.

All pipe shall be continuously and permanently marked with the following information:

Manufacturer's name or trademark, size, schedule and type of pipe. Working pressure at 73 degrees F.

Plastic saddle and flange fittings will not be permitted. Only schedule 80 pipe may be threaded.

When connection is plastic to metal, plastic male adapters shall be used. The male adapter shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be Teflon tape or water based Teflon paste.

2.2 MANUAL VALVES:

A. Ball valves

All manual valves size 2-inch and smaller, shall be ball valves.

2.3 VALVE BOXES:

A. General

All remote control valves, manual control valves, zone shut-off valves, gate valves, ball valves, or globe valves unless otherwise indicated shall be installed in valve access box of

proper size as required for easy access to the valve. Standard valve box to be Carson 1419-12B with locking green cover.

2.4 SPRINKLER HEADS:

A. General

Sprinkler heads shall be of the types and sizes as indicated on the plans. They shall be constructed of bronze, brass, stainless steel, and/or non-metallic materials. All heads of a particular type and for a particular function in the system shall be of the same manufacture and shall be marked with the manufacture's name and identification in such a position that they can be identified without being removed from the system.

2.5 AUTOMATIC IRRIGATION CONTROLLER:

The automatic irrigation controller shall be "Hunter" or equal, approved by the owner's representative. Controller shall be as follows XC – 400i class controller

2.6 AUTOMATIC REMOTE CONTROL VALVES:

All remote control valves shall be of the same manufacture as the selected automatic irrigation controller. Valves shall be globe or angle pattern type and model numbers as indicated on the plans. All valves shall be 24 volt, with epoxy-sealed solenoid coils and throttling system.

2.7 CONTROL CABLE:

All electrical control and ground wire shall be hunter irrigation control cable or approved equal, 14-guage unless otherwise indicated on the drawings. All wiring to be used for connecting the automatic remote control valves to the automatic controllers shall be type "UF" 600 volt, stranded or solid copper, single conductor wire with PVC insulation and bear UL approval for direct underground burial feeder cable.

Insulation shall be 4\64-inch thick minimum covering of ICC-100 compound for positive waterproofing protection. All control or "hot" wires shall be one color and all common or "ground" wires shall be of another color (white). When more than one valve is operated by a single controller station, provide separate control wire from the controller to each valve.

Verification of wire types and installation procedures shall be checked to conform to local codes.

2.8 QUICK COUPLER:

Quick couplers shall be Rainbird 3RC or approved equal. Two (2) quick coupling keys with matching hose swivels, Rainbird model 33K shall be supplied to the owner.

2.9 ATMOSPHERIC VACUUM BREAKER:

Shall be a 1 inch pressure vacuum breaker as approved by the owners' representative.

2.10 OTHER MATERIALS:

A. Materials to be furnished

Supply as part of this contract the following tools:

Two keys for automatic controller.

Two each of each type of head used on project.

Record document copies: Furnish one set.

Maintenance/operating manuals: furnish 4 bound copies.

The above equipment shall be turned over to the owner at the conclusion of the project. Before final inspection can occur, evidence that the owner has received materials must be shown to the owner's representative.

All other materials, not specifically described but required for a complete and proper irrigation system installation, shall be new, first quality of their respective kinds, and subject to the approval of the owner's representative.

Part 3 – EXECUTION

3.1 SURFACE CONDITIONS:

A. Inspection

Prior to all work in this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

Verify that irrigation systems may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.

B. Discrepancies

In the event of discrepancy, immediately notify the owner's representative.

Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 FIELD MEASUREMENTS:

Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design.

3.3 TRENCHING AND BACKFILLING:

Perform all trenching and backfilling as specified by Section 02225 of this specification.

3.4 INSTALLATION OF PIPING:

A. General

Layout the piping system in strict accordance with the plans.

Where piping is shown on the plans to be under paved areas but shown running parallel and adjacent to planted areas, the intention is to install the piping in the planted areas.

B. Pipe depth: All mainlines shall be installed with 18" minimum cover over the pipe. All laterals shall be installed with 12" minimum cover over the pipe.

C. Line clearance

All lines shall have minimum clearance of four inches from each other, and six inches from lines of other trades, except through pipe sleeves.

Parallel lines shall not be installed directly over one another.

D. Inspection of Pipe and Fittings

Carefully inspect all pipe and fittings before installation, removing all dirt, scale, and burrs and reaming as required, install all pipe with all markings up for visual inspection and verification.

E. Plastic pipe

Plastic pipe shall be installed in a manner so as to provide for expansion and contraction as recommended by the manufacture.

All plastic joints shall be solvent-weld joints. Only the solvent weld joints recommended by the manufacturer shall be used. All plastic pipe and fittings shall be installed as outlined and instructed by the pipe manufacturer and it shall be the contractor's responsibility to make arrangements with the pipe manufacturer for any field assistance that may be necessary. The contractor shall assume full responsibility for the correct installation.

All plastic to metal joints shall be made with plastic male adapters.

The solvent-weld joints shall be made dry. The solvent-weld joints shall be allowed to set at least 24 hours before pressure is applied to the system on PVC pipe.

PE piping: SDR Nos. 5.3, 7,9. With PE pipe, compound number required to give pressure rating not less than 150 psi and insert fittings made of PA, PP, or PVC, with serrated male insert ends matching inside of pipe. Include bands or crimp rings.

3.5 INSTALLATION OF EQUIPMENT:

A. General

All fittings, valves, etc. Shall be carefully placed in the trenches as shown on the plans.

All control wires shall be clearly labeled by station. Using weatherproof material, both at the controller and at the valve. The inside covers of all automatic valve boxes shall also have the station clearly painted in white.

All sprinklers, having adjustable nozzles, shall be adjusted for proper and adequate distribution of the water over the coverage pattern of the sprinkler. All nozzles on stationary pop-up sprinklers of stationary spray heads shall be tightened after installation. All sprinklers having an adjusting screw, adjusting stem or adjusting friction collars shall be adjusted as required for the proper arc of coverage, radius, diameter and/or gallonage discharge.

B. Controllers

Installation of controllers shall follow manufacturer's instructions.

Sleeving for the field wiring and hot wiring are required from 6" below ground to the respective inlet on the controller. The run of sleeving will be based on installation height which should be at eye level, about 5' to the base of the controller from the ground.

If controller is placed indoors, all wiring shall run in conduit. Surge protection and grounding shall be provided for each controller installed.

3.6 TESTING AND INSPECTION:

A. Closing-in uninspected work

Do not allow or cause any of the work in this section to be covered up or enclosed until it has been inspected, tested and approved by the owner's representative.

B. Flushing

Before backfilling the mainline, and with all control valves in place , but before lateral pipes are connected, completely flush and test the mainline and repair all leaks; flush out each section of lateral pipe before sprinkler heads are attached.

C. Testing

Make all necessary provisions for thoroughly bleeding the line of air and debris.

Before testing, fill the line with water for a period of at least 24 hours.

After valves have been installed, test all live water lines for leaks at a pressure of 150 psi for a period of two hours, with all couplings exposed and all pipe sections center loaded

Furnish all necessary testing equipment and personnel.

Correct all leaks and re test until acceptance by the owners representative.

D. Final inspection

Thoroughly clean adjust, and balance all systems

Demonstrate the entire system to the owner's representative, proving that all remote control valves are properly balanced, that all heads are properly adjusted for radius and arc of coverage, and that the installed system is workable, clean, and efficient.

3.7 INSTRUCTIONS

A. Record Drawings

Record accurately on one set of black and white prints of the site plan and all installed work including both pressure and non-pressure lines.

Upon completion of each increment of work, transfer all such information and dimensions to the print. The dimensions shall be recorded in a legible and workmanlike manor. Maintain as-built drawings on site at all times. Make all notes on drawing in pencil (no ball point pen). When the work has been completed, transfer all information from the field record print to a set of reproducible drawings.

Dimension from two permanent points of reference (buildings, monuments, sidewalks, curbs, pavement, ect.) locations shown on as-built drawings shall be kept day to day as the project is being installed. All dimensions noted on drawings shall be 1/8 inch in size (minimum).

Show locations and depths of the following items:

Point of connection

Routing of sprinkler pressure lines

Gate valves

Sprinkler control valves

Quick coupling valves

Routing of control wires

Sprinkler heads

Other related equipment

B. Controller charts

As-built drawings must be approved by owner's representative before charts are prepared.

Provide one controller chart for each controller supplied showing the area covered by automatic controller, of the maximum size controller door will allow.

The chart is to be a reduced drawing of the actual as-built system. Chart shall be a photo positive with different colored shading used to show area of coverage for each station. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic. The chart shall be mounted in the controller using Velcro of equal type of semi-permanent fastening device.

These charts must be completed and approved prior to final acceptance of the irrigation system by the owner.

C. Operation and maintenance manuals

Prepare and deliver to the owner's representative within ten calendar days prior to completion of construction all required and necessary descriptive material in complete detail and sufficient quantity, prepared in four bound copies of the operations and maintenance manual. The manual shall describe the material installed and shall be of sufficient detail to permit operating personnel to understand, operate and maintain all equipment. Spare parts lists, and related manufacture information shall be included for each equipment item installed. Each complete, bound manual shall include the following information.

Index sheet stating Contractors address and telephone number, duration of guarantee period, list of equipment with names and addresses of local manufacture representatives.

Complete operating maintenance instructions on all major equipment.

In addition to the above maintenance manuals, provide the maintenance personnel with instructions for system operation and show written evidence to the owner at the conclusion of the project that this service has been rendered.

3.8 GUARANTEE PERIOD:

A. Guarantee

The entire irrigation system shall be guaranteed to give satisfactory service for a period of one year from the date of acceptance by the owner.

Should any trouble develop within the time specified above due to inferior or faulty materials or workmanship, the trouble shall be corrected at no expense to the owner.

Any and all damages resulting from faulty materials or workmanship shall be repaired by the contractor to the satisfaction of the owner, at no cost to the owner.

B. Guarantee Period Services

The contractor shall winterize the system and perform spring start-up of the system during the guarantee period. These functions shall be coordinated in advance with the owner, and the owner's personnel shall be encouraged to participate.

Upon re-energizing the system, the contractor shall repair any leaks or breaks and shall check each head and valve, making any adjustments necessary.

END OF SECTION 02760